

CLAIMS

1. A method for traffic control in a communication system (100) comprising a plurality of access networks (20) and at least one mobile multi-access terminal (10) comprising the steps of
- receiving, at a network-based traffic control server (61) of the communication system, access-related information from at least a subset of the access networks;
 - coordinating the access-related information at the traffic control server;
 - determining a traffic control signal through adaptive traffic control calculations based on the coordinated access-related information; and
 - spreading, at a traffic control client (12) of the multi-access terminal, traffic over the access networks in response to the traffic control signal.
2. The method of claim 1, wherein the adaptive traffic control calculations involves iteratively executing an adaptive traffic control algorithm for reaching a predetermined control objective.
3. The method of claim 1, wherein the spreading step involves distributing traffic over at least two access networks substantially simultaneously.
4. The method of claim 1, wherein the determining step is performed at the traffic control server (61) and involves a traffic-spread decision by the traffic control server, and the method further comprises forwarding the traffic spread decision to the traffic control client (12).
5. The method of claim 1, wherein the determining step is performed at the traffic control server (61) and the method further comprises the steps of
- transmitting a traffic distribution recommendation comprising the traffic control signal from the traffic control server to the traffic control client (12); and

- deciding, at the traffic control client, how to spread traffic over the access networks (20) based on the traffic distribution recommendation.

5 6. The method of claim 4 or 5, comprising the further step of receiving, at the traffic control server (61), terminal-specific access information from the multi-access terminal (10), the terminal-specific access information being used in the determining and/or deciding step at the traffic control server.

10 7. The method of claim 1, comprising the further step of forwarding the coordinated access-related information from the traffic control server (61) to the traffic control client (12), and wherein the determining step is performed at the traffic control client.

15 8. The method of claim 1, wherein the traffic spreading step is further based on terminal requirements and/or access network requirements.

20 9. The method of claim 1, wherein, for a communication system (100) with a plurality of multi-access terminals (10), for at least a subset of the multi-access terminals, traffic controlling actions are performed at different network positions for different multi-access terminals.

25 10. The method of claim 1, wherein the adaptive traffic control calculations involve minimizing the difference between a desired value and a current value of an access-related parameter.

30 11. The method of claim 10, wherein the desired value of the access-related parameter is determined at the respective access network (20) and included in the access-related information transmitted to the traffic control server (61) from the respective access network.

12. The method of claim 10, comprising the step of determining the desired value of the access-related parameter at the network-based traffic control server (61).

13. The method of claim 1, wherein the traffic spreading step at the traffic control client (12) is session-based.

5 14. The method of claim 13, wherein the traffic spreading step in turn comprises the steps of

- receiving a session request at the multi-access terminal (10);
- selecting an access network (20) for the session (15) of the session request at the traffic control client (12) in the multi-access terminal; and
- 10 - associating the session with the selected access network at the traffic control client, whereby packets of the session are directed to the selected access network.

15 15. The method of claim 1, comprising the further steps of

- assigning a respective mobility IP address for each access network (20) of the multi-access terminal (10); and
- associating, at the multi-access terminal, the respective mobility IP addresses with respective virtual access network interfaces (18).

20 16. The method of claim 2, wherein the adaptive traffic control algorithm is selected from the group of a proportional and integral (PI) control algorithm, a proportional, integral and derivative (PID) control algorithm, a proportional (P) control algorithm, a minimum-variance control algorithm and an RST control algorithm.

25 17. The method of claim 1, wherein the traffic control server (61) is associated with an overall access server (60) with means for access handling, mobility and security.

30 18. A communication system (100) including a plurality of access networks (20), at least one mobile multi-access terminal (10), and means for traffic control, comprising

- means for receiving, at a network-based traffic control server (61) of the communication system, access-related information from at least a subset of the access networks;

5 - means for coordinating the access-related information at the traffic control server;

- means for determining a traffic control signal through adaptive traffic control calculations based on the coordinated access-related information; and

10 - means for spreading, at a traffic control client (12) associated with the multi-access terminal, traffic over the access networks in response to the traffic control signal.

15 19. The system of claim 18, wherein the means for determining in turn comprises means for iteratively executing an adaptive traffic control algorithm for predetermined control purposes.

20 20. The system of claim 18, wherein the means for determining is arranged at the traffic control server (61) and the system further comprises

20 - means for transmitting a traffic distribution recommendation comprising the traffic control signal from the traffic control server to the traffic control client (12); and

25 - means for deciding, at the traffic control client, how to spread traffic over the access networks (20) based on the traffic distribution recommendation.

25 21. The system of claim 18 having a plurality of multi-access terminals (10), wherein, for at least a subset of the multi-access terminals, different multi-access terminals comprise traffic control means associated with different degrees of self-control.

30 22. The system of claim 18, wherein the traffic control server (61) is associated with an overall access server (60) with means for access handling, mobility and security.

23. The system of claim 18, wherein the access networks (20) of the communication system include at least one access network using a technology selected from the group of GPRS, WLAN, Ethernet, Bluetooth,
5 WiFi, xDSL, CDMA, WCDMA and cable modem.

24. A network-based traffic control server device (61) in a communication system (100) including a plurality of access networks (20), at least one mobile multi-access terminal (10) and means for traffic control, said server
10 device comprising

- means for receiving access-related information from at least a subset of the access networks;

- means for coordinating the access-related information;

- means for determining a traffic control signal through adaptive traffic
15 control calculations based on the coordinated access-related information;
and

- means for transmitting traffic distribution information comprising the traffic control signal to a traffic control client (12) of the multi-access
terminal.

20 25. The server device of claim 24, wherein the means for determining in turn comprises means for iteratively executing an adaptive traffic control algorithm for predetermined control purposes.

25 26. The server device of claim 24, wherein the means for determining comprises traffic-spread deciding means, and the server device (61) further comprises means for forwarding the traffic spread decision to the traffic control client (12).

30 27. The server device of claim 24, wherein the traffic distribution information comprises a traffic distribution recommendation based on which traffic can be spread over the access networks (20).

28. The server device of claim 24, further comprising means for receiving terminal-specific access information from the multi-access terminal (10).

29. The server device of claim 24, wherein the coordinating step involves
5 aggregating or processing the access-related information.

30. The server device of claim 24, wherein the adaptive traffic control calculations involve minimizing the difference between a desired value and a current value of an access-related parameter.

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31. The server device of claim 25, wherein the adaptive traffic control algorithm is selected from the group of a proportional and integral (PI) control algorithm, a proportional, integral and derivative (PID) control algorithm, a proportional (P) control algorithm, a minimum-variance control
15 algorithm and an RST control algorithm.

32. The server device of claim 24, being associated with an overall access server (60) with means for access handling, mobility and security.

20 33. A mobile multi-access terminal (10) in a communication system (100) including a plurality of access networks (20), a network-based traffic control server (61) and means for traffic control, said terminal comprising

- means for receiving, at a traffic control client (12), traffic distribution information comprising a traffic control signal determined through adaptive
25 traffic control calculations from the traffic control server; and
- means for spreading, at the traffic control client, traffic over the access networks in response to the traffic control signal.

34. The multi-access terminal of claim 33, wherein the means for spreading
30 involves means for distributing traffic over at least two access networks substantially simultaneously.

35. The multi-access terminal of claim 33, wherein the means for spreading in turn comprises

- means for receiving a session request;

- means for selecting an access network (20) for the session (15) of the
5 session request at the traffic control client (12); and

- means for associating the session with the selected access network at the traffic control client, whereby packets of the session are directed to the selected access network.